REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 63, 64, 66-69 and 71-75, 77 and 78 are pending, with Claims 1-62, 65, 70, 76, and 79-125 canceled and Claims 63, 68, 73, 74, and 77 amended by the present amendment.

In the Official Action, Applicants' claim to priority was objected; Claim 73 was rejected under 35 U.S.C. § 112, second paragraph; Claims 63, 68, and 73 were rejected under 35 U.S.C. § 102(b) as being anticipated by Jewell et al. (U.S. Patent No. 4,949,350, hereinafter Jewell); Claims 63, 65-68, and 70-73 were rejected under 35 U.S.C. § 102(e) as being anticipated by Villareal et al. (U.S. Patent No. 6,850,548, hereinafter Villareal); Claims 64, 69 and 75 were rejected under 35 U.S.C. § 103(a) as unpatentable over Villareal in view of Applicants' admitted prior art; and Claims 74 and 76-78 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Villareal.

With regard to Applicants' claim to priority, Applicants submit that original Claims 63-78 are fully supported by Figures 132-146 and pages 349-362 of Applicants' specification, which were added via Applicants' continuation-in-part (CIP) application.

Independent Claims 63, 68 and 74 are amended to include the subject matter of now canceled original Claims 65, 70 and 76, respectively. Thus, the rejections under 35 U.S.C. § 102(b) in view of Jewell are moot.

Briefly recapitulating, amended Claim 63 is a semiconductor distributed Bragg reflector comprising: an alternate stacking of first and second semiconductor layers having respective, different refractive indices; and a plurality of intermediate layers each sandwiched between a first semiconductor layer and a second semiconductor layer, the intermediate layer having a refractive index intermediate between the refractive indices of the first and second semiconductor layers. An intermediate layer is provided in a region of the semiconductor distributed Bragg reflector having a thickness different from an intermediate layer provided

distributed Bragg reflector having a thickness different from an intermediate layer provided in a different region of the semiconductor distributed Bragg reflector. The intermediate layers have different thicknesses and different doping concentrations within the semiconductor distributed Bragg reflector, the thickness and doping concentration being set in correspondence to electric field strength of light within the semiconductor distributed Bragg reflector.

Villareal describes an asymmetric distributed Bragg reflector (DDR) suitable for use in vertical cavity surface emitting lasers. The asymmetric DDR is comprises of stacked materials layers having different indexes of refraction that are joined using asymmetrical transition regions in which the transition steps within a transition region have different material compositions, different doping levels, and different layer thicknesses. Adjacent transition regions have different transition steps. Thinner transition regions are relatively highly doped and are located where the optical standing wave within the DDR has a low field strength. Thicker transition regions are relatively lightly doped and are located where the optical standing wave has a relatively high field strength.[1]

However, Villareal does not disclose or suggest a semiconductor distributed Bragg reflector where intermediate layers have different thicknesses and different doping concentrations and the thicknesses in doping concentrations are set in correspondence to the electric field strength of light within the semiconductor distributed Bragg reflector.

Column 5, line 50 through column 6, line 2 of Villareal, cited in the Official Action as describing the above described feature, refers to Figure 3 of Villareal and notes that the closest vertical line spacing occurs when the electric field is smallest (close to zero). This indicates the relatively small thicknesses of the layers that form an AlAs-to-GaAs junction. The layers that form that junction have relatively high doping levels which decrease the

[1] Villareal, Abstract.

electrical resistance across the transition region. However, because the electric field is low in that transition region, the optical absorption is also low, despite the high doping levels. Where the electric field is high, the vertical line spacing is relatively large, which represents relatively thick individual layers. This represents an interference junction where the GaAs composition changes to AlAs. That area is relatively lightly doped to help to decrease optical absorption of the locally high electric field. The relatively large thicknesses of the transition region helps to decrease the electrical resistance without significantly increasing the optical absorption.[2]

However, contrary to the Official Action, the cited portion of Villareal, as well as the remainder of Villareal, fails to disclose or suggest Applicants' claimed setting of a thickness and doping concentration in correspondence to electric field strength of light within the semiconductor distributed Bragg reflector. As shown in FIG. 132 of Applicants' specification, DBR-I and DBR-II form together a semiconductor distributed Bragg reflector of Applicants' thirty second embodiment The DBR-I includes an intermediate layer of p-AlGaAs between a p-GaAs layer and a p-AlAs layer as shown in FIG. 134 with a thickness of 60 nm as described in page 352, line 6 and page 352, lines 21-24, while the DBR-II includes an intermediate layer of p-AlGaAs between a p-GaAs layer and a p-AlAs layer as shown in FIG. 134 with a thickness of 30 nm as described in page 352, line 16 and page 352, lines 21-24. The impurity doping concentration is set smaller in the region I (Bragg reflector I), to which the light comes in an hence the electric field strength of the light is large, than in the region II (Bragg reflector II) as set forth in page 353, line 19 to page 354, line 9, it becomes possible to reduce the optical absorption of the DBR caused by free carrier absorption or intra-valence band absorption. Thus, with the present invention, it becomes possible to reduce the optical absorption of DBR by decreasing the impurity concentration level in the

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[2] Villareal column, line 50 through column 6, line 2.

part where the electric field strength of the incoming light is large while minimizing at the same time the problem of increase of resistance caused by decreasing the impurity concentration level, by increasing the thickness of the intermediate layer in such a part where the impurity concentration level is decreased. The structure and benefits of Applicants' claimed invention is not present in Villareal.

MPEP § 2131 notes that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See also MPEP § 2131.02. "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Because Villareal does not disclose or suggest all the features recited in Claims 63, 68 and 74, Villareal does not anticipate the invention recited in Claims 63, 68 and 74, and all claims depending therefrom.

Accordingly, in view of the present amendment and in light of the previous discussion, Applicants respectfully submit that the present application is in condition for allowance and respectfully request an early and favorable action to the effect.

Respectfully submitted,

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